

diesel engine to regulate the start of combustion during the compression stroke or early in the expansion stroke of each combustion cycle (Abstract).

Claim 1 recites, among other features, temperature un-uniformity adding means for acting on the air-fuel mixture gas to enhance temperature un-uniformity of the air-fuel mixture gas at a predetermined acting timing which is within a middle phase of the compression stroke and prior to fuel pyrolysis starting timing, if the compression stroke is divided into an early phase of the compression stroke, the middle phase of the compression stroke, and a late phase of the compression stroke, the early phase of the compression stroke being a period in which mixing of the air-fuel mixture gas proceeds rapidly due to a turbulent flow in the combustion chamber, the middle phase of the compression stroke being a period in which the mixing of the air-fuel mixture gas proceeds relatively moderately and the combustion reaction becomes more active gradually, and the late phase of the compression stroke being a period in which an explosive combustion reaction occurs, in such a manner that the temperature un-uniformity of the air-fuel mixture gas at the fuel pyrolysis starting timing which is within a compression stroke is made greater than temperature un-uniformity of the air-fuel mixture gas at the fuel pyrolysis starting timing obtained only by simply compressing the air-fuel mixture gas during the compression stroke, and so that the combustion is more moderate than combustion which occurs only by simply compressing the air-fuel mixture gas during the compression stroke.

In its disclosure of a water injection system, Dickey is significantly different in function and structure from the control apparatus recited in the pending claims. For instance, Dickey does not disclose the decomposition of the compression stroke into the three specific phases that are recited, for example, in independent claim 1. It is during the positively-recited middle phase in which a predetermined acting timing for the temperature un-uniformity adding means is effected.

In citing to the above portion of Dickey for rejecting the pending claims, the Office Action points to an in-cylinder injector that may either be a dual fluid injector, adapted to separately inject either water or diesel fuel at desired times during the compression stroke, or, when used in conjunction with a port fuel injector, may comprise a single fluid water injector. The operation of the injector system and the timing of water injection in Dickey do not reference any, for example, phase in a compression stroke that can reasonably be considered to suggest the middle phase positively recited in the pending claims. In fact, at col. 5, line 35 and below, as referenced in the Office Action, Dickey teaches fuel is desirably injected into the chamber at a first selected time as controlled by an ECU during an early phase of the compression stroke of the cylinder operating cycle. Water is injected into the chamber at a second selected time, as controlled by the ECU, during the same compression stroke of the cylinder operating cycle. Generally, water is injected into the chamber at a later time than that at which the fuel is injected into the chamber to permit homogeneous mixing of the fuel and intake air prior to water injection in Dickey. Dickey notes that depending on operating conditions and/or the particular engine configuration, water injection may occur before, during, or after fuel injection to regulate the start of, and control the rate of, combustion. More specifically, Dickey states "depending on combustion timing, water may advantageously be injected during the compression stroke or very early in the expansion stroke" (col. 5, lines 47-54). Simply because Dickey can inject water at varying times does not mean that Dickey can be relied upon as teaching the specifically positively recited features of, for example, independent claim 1.

The middle phase recited in claim 1, in which temperature is controlled, is not specifically taught by the Dickey reference explicitly or impliedly. In fact, if the Office Action is attempting to rely on some theory of inherency, the Office Action fails to show how each of the positively recited claimed features, not expressly disclosed in Dickey, necessarily

flows from any disclosure in that reference. Federal Circuit precedent, as referred to in MPEP §2112, instructs that the Patent Office must provide rationale or evidence tending to show inherency. "The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic" (citations omitted, emphasis in original). Citing Federal Circuit precedent, the MPEP states that "[i]nherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient" (citations omitted). Further, §2112 states, "[i]n relying upon a theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art" (citations omitted, emphasis in original). This standard is certainly not met with any assertion made in this Office Action. Therefore, at least to the extent that the Office Action relies on some theory of inherency for those features which are recited in the pending claims that are not explicitly disclosed in Dickey, the rejections of the Office Action necessarily fail.

With respect to certain features positively recited in one or more of the dependent claims, claims 6 and 7, for instance, recite "wherein said high pressure fluid is high pressure air" and "wherein said high pressure fluid is high pressure hydrogen or high pressure carbon monoxide," respectively. There is nothing in Dickey to suggest that the alleged high pressure fluid recited in that reference is anything other than water for use in a water injection system. It should be noted that the use of injection fluids that can be consumed during the combustion increases the thermal efficiency of the engine compared to water injection because water does not function to increase the temperature in the cylinder during combustion.

Additionally, with respect to, for example, claim 10, and other of the independent claims, there is nothing in Dickey that can reasonably be considered to teach, or to have suggested, the recited spark ignition means. There is, for example, nothing in Dickey to

suggest that the disclosed internal combustion engine could be operated in a pre-mixed charge self-ignition mode and a spark-ignition mode, as is positively recited, for example, among other features in independent claims 10, 14 and 19. The analysis of the Office Action with respect to claims 23 and 24 is equally improper.

Applicants believe that the Office Action overly broadly interprets the disclosure of Dickey for what is can reasonably be considered to teach, or to have suggested, with respect to the subject matter of the pending claims. Dickey clearly does not teach the detailed combinations of all of the features positively recited in the pending claims, and their detailed interrelationships.

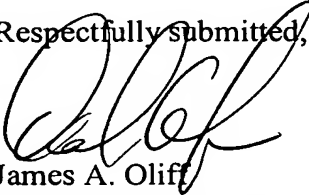
For at least the foregoing reasons, Dickey cannot reasonably be considered to teach, or to have suggested, the combinations of all of the features positively recited in, for example, independent claims 1, 10, 14, 19, 23 and 24. Further, claims 2-9, 11-13, 15-18, 20-22 and 25 also are neither taught, nor would they have been suggested, by Dickey for at least the respected dependence of these claims directly or indirectly on allowable base claims, as well as for the separately patentable subject matter that each of these claims recites. See, for example, the discussion of claims 6 and 7 above.

Accordingly, reconsideration and withdrawal of the rejection of claims 1-25 under 35 U.S.C. §102(b) as being anticipated by Dickey are respectfully requested.

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-25 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number set forth below.

Respectfully submitted,



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